are due to Dr. D. S. Hill, Commonwealth Institute of Entomology, London, for confirming the identity of the parasite.

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18. HONEY BEES AND WASPS AS PESTS OF GRAPE

Honey bees usually feed on nectar but, the Indian Honey Bee, *Apis indica* F. and Wasps, *Polistes hebraeus* (Fb.) and *Vespa orientalis* Linn. damage the ripening grape berries in Madhya Pradesh. *A. indica* has not so far been reported as a pest of grapes as far as the author is aware.

Exotic varieties of grapes, particularly Perlette, Muscat, and Beauty Seedless are the most promising varieties of economic importance in Madhya Pradesh. They start ripening from the middle of May and the fruiting season is almost over by the end of June. During 1962, 1963 and 1968, at Gwalior a single vine on an average bore 136, 147, and 183 bunches consisting of 2,441, 2,876 and 3,087 berries, respectively. The berries of Perlette and Muscat are light greenish to light yellowish in colour, seedless, sweet, having edible thin skin, tasty and of pleasing texture. The normal sugar content of these fruits is 18 per cent with acid at 0.8 per cent. They are the most preferred by *A. indica* followed by Beauty Seedless that are purplish in colour whereas the seeded varieties with inedible skin are comparatively less favoured and sour varieties are least favoured. Hard inedible skinned varieties almost escape damage. The percentage of damaged berries in Perlette and Muscat varieties varied from 15.6 to 64.8 and 12.7 to 58.6 respectively, during 1962, 17.2 to 63.5 and 10.7 to 54.5 during 1963; and 18.7 to 70.3 and 13.5 to 62.7 during 1968. The infestation attains a peak during the first fortnight of June. No varietal preference has been observed by wasps. The bees and wasps make minute punctures on the ripe and ripening berries only and feed on the pulp by gnawing the epicarp leaving the skin behind. Such infested berries either remain on the bunch or fall to the ground. During 1966 and 1967, the pests of grape vine at Jabalpur in Madhya Pradesh were also surveyed. Thrips caused maximum damage during the blossom and fruiting stage, adversely affecting fruit formation and causing cracking and scab formation on grapes. Bees and wasps were secondary minor pests on these cracked berries at Jabalpur. At Gwalior, honey bees and wasps are major pests of grapes irrespective of thrips infestation, and are a potential menace as well as a great setback to the

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cultivation of grapes in this region. If the ripening bunches are not protected by paper bags, no ripe fruit can be harvested and even the cost of cultivation cannot be realised.

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19. ANEMOTACTIC RESPONSE IN THE FIREFLY, *LUCIOLA* SP. (COLEOPTERA: LAMPYRIDAE)

Positive response to wind currents by insects has been observed by many workers (Wheeler 1899; Fraenkel 1932; Kennedy 1939). Terms such as anemotropism and anemotaxis have been applied to this behaviour. In some cases, the positive reaction to air currents is closely linked up with visual or olfactory stimuli (Fraenkel & Gunn 1961).

During the second week of May, 1968 fairly large numbers of the firefly, *Luciola* sp. were seen flying around trees at night in the Malabar Christian College compound. At night, around 9 p.m., about ten of them flew into our room, evidently attracted by the electric light. An electric ceiling fan was at that time, revolving at top speed in the room. It was observed that the fireflies flying inside the room were frequently knocked down by the blades of the fan. In order to find out whether the flight orientation was in any way connected with the wind current produced by the fan, the lights in the room were switched off and there was total darkness. The course of flight of the fireflies could be easily followed with the help of the bright flashes of greenish yellow light produced by them. It was found that the insects persistently flew towards the fan, directly against the strong wind current. This is a positive and directional response to the wind current, which is apparently not connected with any other stimuli and it may therefore be termed positive anemotaxis.